Coiling after Treatment with the Woven EndoBridge Cerebral Aneurysm Embolization Device

A Case Report

A.K. WALLNER[1], E. BROUSSALIS[2], T. HAUSER[3], E. TRINKA[2], M. KILLER-OBERPFALZER[1,2]

[1] *Research Institute of Neurointervention,* [2] *Department of Neurology,* [3] *Department of Neurosurgery, Paracelsus Medical University, Christian Doppler Clinic; Salzburg, Austria*

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Summary

Retreatment options after the use of the newly launched Woven EndoBridge cerebral aneurysm embolization device (WEB II) are mostly unknown. Nine months after WEB II implantation, a 55-year-old female patient presented with regrowth of an MCA aneurysm. For the first time, standard balloon-assisted coiling was used to close the regrown aneurysm proximal to the WEB II implant. We report on the feasibility and safety of balloon-assisted coiling after implantation of the WEB II device.

Introduction

Today, many different endovascular devices are available for the treatment of wide-necked intracranial aneurysms. Standard coiling as well as balloon- and stent-assisted coiling, the use of flow diverters and the double microcatheter technique aim to protect parent arteries, preserve luminal patency and make the treatment of even complex neck configurations more feasible [1-11]. The newly introduced Woven EndoBridge cerebral aneurysm embolization device (WEB II) promises convincing initial success in the treatment of complete and permanent occlusion [12]. But the possibility of device migration, regrowth of aneurysm and treatment options for recanalization after the use of the WEB II remains subject to further discussion and investigation.

The WEB II is a compliant, double-layer metallic mesh device, designed to function as an endovascular flow diverter (Figure 1) [13].

This case report describes our first experience of recoiling after WEB II use.

Technique

A 55-year-old woman presented to our institute with unruptured aneurysms of the left MCA bifurcation (6.2×7.8 mm) and the right ICA terminus (3.2×3.4 mm). The ICA aneurysm was coiled by standard technique in January 2011, the MCA aneurysm was treated with a WEB II device 6×7 mm (Sequent Medical Inc., Aliso Viejo, CA, USA) in December 2010. Six month follow-up showed a continuous progression of neck filling proximal to the WEB II device compared to the post procedure MRI. Scheduled follow-up DSA confirmed significant reperfusion at the neck of the MCA aneurysm (4.8×3.9 mm). The WEB II device seemed to be pushed distally (Figure 2C). The ICA terminus aneurysm remained stable (Figure 2C). The patient was informed in detail about neurosurgical alternatives, but decided to go for endovascular treatment. Because of primarily coronary stenting, the patient was under constant medication with clopidogrel and acetyl-

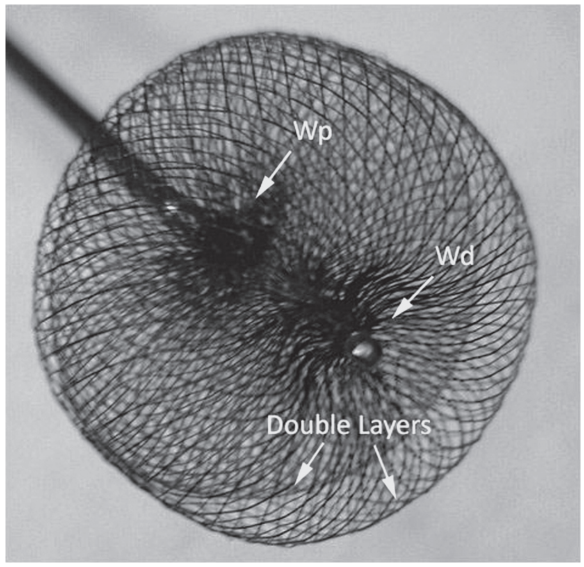


Figure 1 Fully expanded WEB II device. The distal marker (Wd), proximal markers (Wp) and the double layer mesh of the device are marked (arrow).

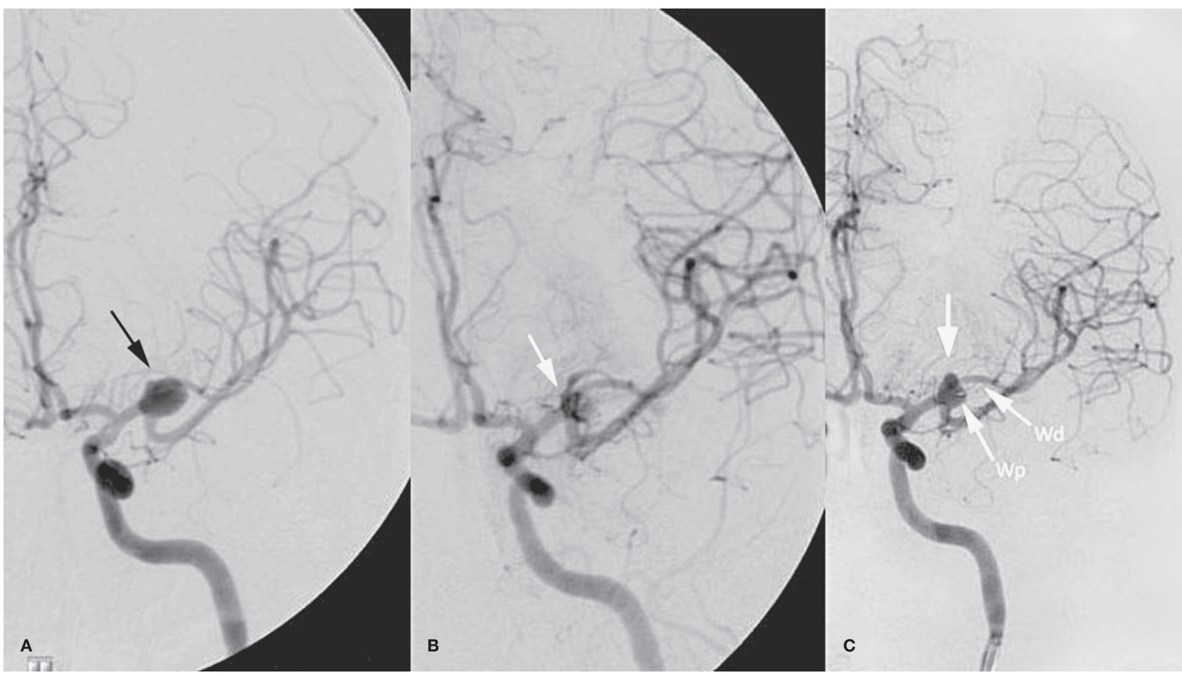
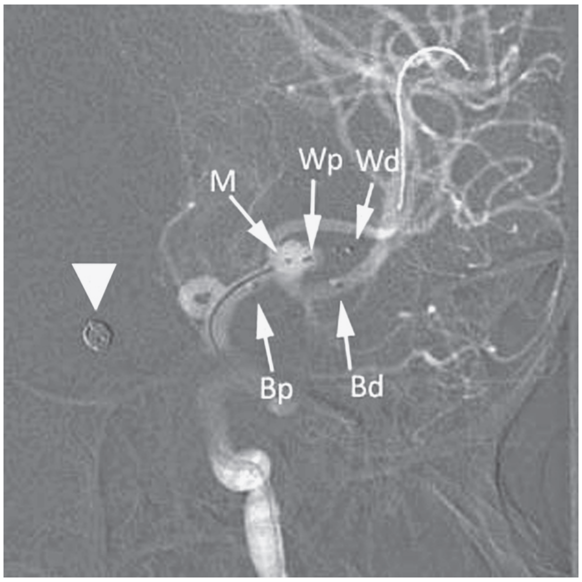


Figure 2 A) DSA, AP view, shows left MCA bifurcation aneurysm before (black arrow) and B) directly after WEB II implantation. Discrete contrast filling at the aneurysm neck is demonstrated (white arrow). C) DSAs, AP view showing MCA aneurysm after 9 months with flow signal indicating regrowth (arrow). Wp proximal WEB II marker, Wd distal WEB II markers within the aneurysm sac.

salicylic acid (ASA). But plasma levels were not in therapeutic range despite the administration of a double dosage (150 mg Plavix® Sanofi Pharma Bristol-Myers Squibb SNC, France). Therefore the patient was considered to be a non-responder, making stent-assisted coiling nonpreferential regardless of the technical possibility. Those factors led to the decision to coil the regrown aneurysm with balloon-assistance.

The procedure was performed according to the standard neurointerventional technique. Intervention was performed on a biplane angiosuite (Artis zee Biplane System, Siemens AG,

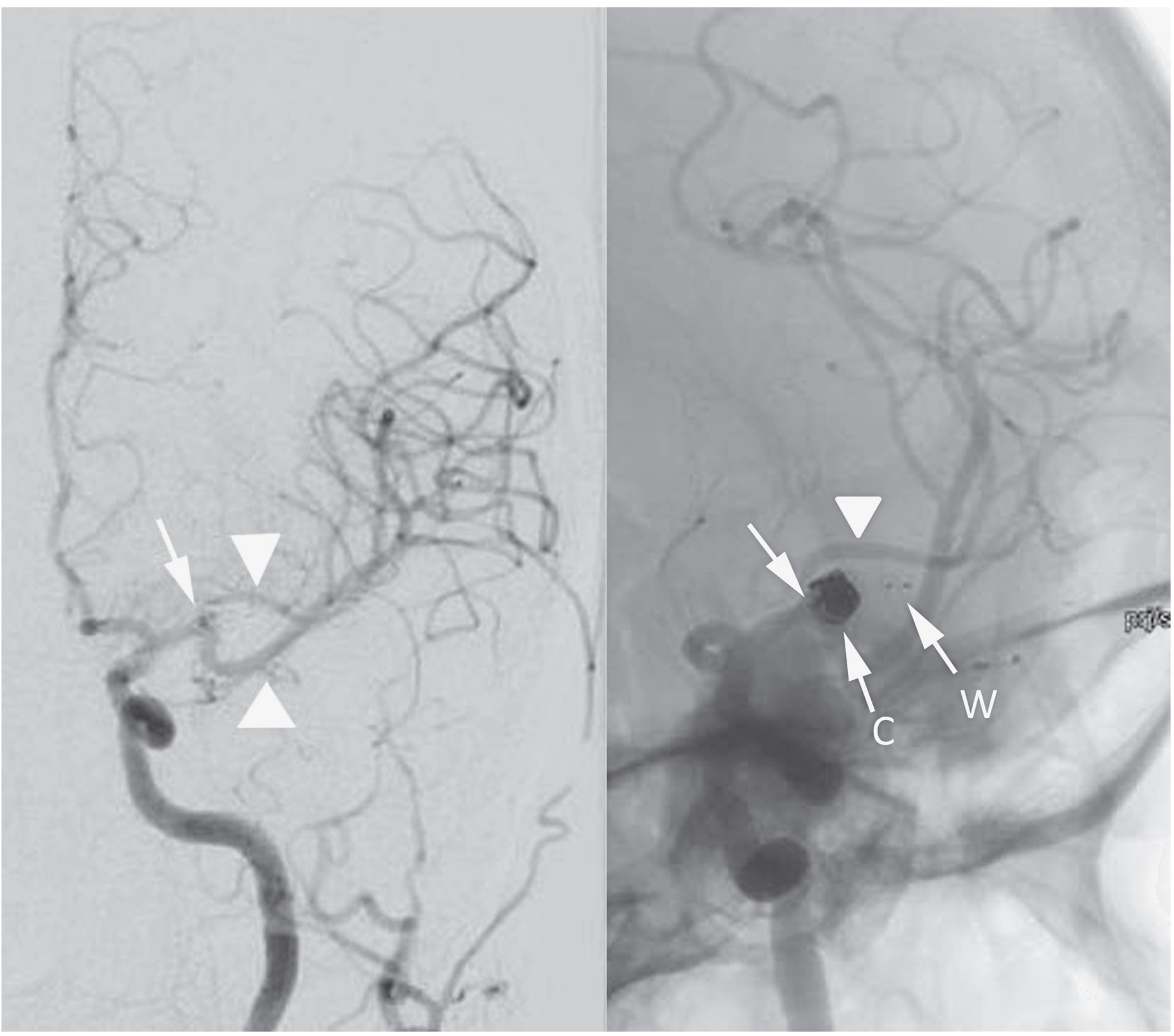


← *Figure 3* Road map picture in working projection shows the position of initially placed Ascent balloon: proximal balloon marker (Bp), distal balloon marker (Bd), proximal WEB II marker (Wp), distal WEB II markers (Wd), distal marker of microcatheter within the aneurysm sac (M). Right ICA terminus aneurysm (arrowhead).

Figure 4 A) DSA in working projection and B) native picture show outcome after recoiling: Discreet filling at the aneurysm (arrow), but no parent artery restriction (arrow head). Correlation of the cast of the coils (C) and the WEB II device (W) is shown. ↓

A

B



Germany), under general anesthesia and 5.000 IE heparin IV.

The left ICA was catheterized using a standard femoral access device (Radifocus® Introducer II 6F, Terumo® Medical, NJ, USA) with an Envoy guiding catheter 6F (Codman Neurovascular, Raynham, MA, USA). After DSA and 3D reconstruction the reperfused aneurysm neck at the left MCA bifurcation was displayed in a working projection (Figure 2A-C). The neck of the aneurysms was then bridged using an Ascent occlusion balloon catheter 4×10 mm (Codman Neurovascular, Raynham, MA, USA), which was used together with a TraxcessTM 14 guidewire (MicroVention® Terumo, Inc., Tustin, CA, USA). A Headway 17 advanced microcatheter 150 cm/11 cm (MicroVention® Terumo) was placed via the same guide catheter through a second rotating valve in the aneurysm sac proximal to the WEBII device. After a framing coil (MicroPlex 10 - 4 mm×12 cm Compass Complex, MicroVention® Terumo) three MicroPlex 10 - 2 mm×6 cm HyperSoft helical (MicroVention® Terumo) coils were used for embolization (Figure 3). Coiling was performed under balloon protection to avoid coil loop protrusion. The final angiographic result showed a nearly completely coiled aneurysm with intact and prompt contrast filling of the parent arteries (Figure 4A,B). At the end of the uneventful procedure an Angio-SealTM 6F (St. Jude Medical, Inc., St. Paul, MN, USA) vessel closure system was deployed.

Discussion

The primary intention of aneurysm treatment is to prevent rupture and re-rupture, respectively and therefore to occlude the aneurysm as completely as possible. Despite numerous available endovascular devices, retreatment of aneurysms, especially wide-necked aneurysms, remains an ongoing challenge, facing difficulties especially due to the fact that clopidogrel resistance makes stent treatment non-preferential. We report on the successful balloon-assisted recoiling [14] of an aneurysm after WEB II implantation nine months prior to the procedure, which was primarily used to avoid the necessity of stent deployment.

The WEB II device is not assumed to be able to compact and therefore to cause recanalization because of its round, non compressible configuration [12]. Our experimental experience showed that properly sized devices create a complete and stable aneurysm occlusion.

In this case the increased filling of the aneurysmal neck in the follow-up is not likely to be the cause of device compaction. We hypothesize that refilling is possible due to two mechanisms. One is device migration, especially if the device was not properly sized for the initial procedure, as in our case. The WEB II device was chosen slightly too small for the given aneurysm size, due to the concern not to rupture the aneurysmal sac during deployment resulting in an acceptable small neck remnant. This size difference may have facilitated the device to be pushed more distally towards the original aneurysm dome by the blood flow, and therefore a kind of reopening the aneurysmal sac at the neck.

The other consequential explanation is aneurysmal regrowth, depending on growth tendency because of aneurysmal wall weakness. The primarily measured aneurysm was 6.2×7.8 mm and was treated with a 6×7 mm WEB II device. The difference of 0.2×0.8 mm does not explain the refilling of 4.8×3.9 mm proximal to the WEB II device. Device migration may have led to a small neck remnant, in our opinion additional aneurysm growth enables a refilling as much as 4.8×3.9 mm.

The six month MRI follow-up showed definite refilling of the neck remnant and led to the decision of retreatment. The outcome of the aneurysm treatment was now similar to an incompletely coiled aneurysm case. Since reembolization is mandatory to protect from rupture, feasibility for the use of secondary endovascular devices after WEB II embolization had to be confirmed.

Balloon-assisted coiling in direct contact to the WEB II device proved to be a technically simple procedure and successful without any complications. No stiffness due to metal-metal interaction was observed. The microcatheter was inserted into the aneurysmal sac proximal to the WEB II device and new aneurysmal sac. To describe it in more detail the open space between parent artery and device was coiled. Entering the WEB II basket was not possible and not necessary because of its tight mesh and because the blood flow into the aneurysm was outside the device, not inside. The procedure was similar to other balloon-assisted recoiling procedures.

Further studies have yet to investigate the long-term stability and safety of WEB II devices with and without additional coiling.

Conclusion

The WEB II device proved to behave similarly to coils in the long-term follow-up. Device size should resemble aneurysm shape as precisely as possible and cover the neck completely, otherwise recanalization and regrowth of the aneurysm may be a potential consequence. However, as recoiling is commonly used in primary coiled aneurysms to deal with aneurysmal regrowth, the feasibility of coiling after WEB II implantation could be proven without any limitations.

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Dr Anna Kristina Wallner
Reseach Institute of Neurointervention
Department of Neurology
Paracelsus Medical University
Christian Doppler Clinic,
Ignaz-Harrer Str. 79, 5020 Salzburg, Austria
Tel.: +43 662 4483 56058
Fax: +43 662 4483 3924
E-mail: anna.wallner@pmu.ac.at